MSX

MSX: Past, Present, and Future

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Machines(Hardwares) with Software eXchangeability

At the time, it was extremely unusual for so many home electronics manufacturers to adopt and manufacture a standardized computer system.

Japan	Matsushita, Sony, Japan Victor Corp, Yamaha, Sanyo, Hitachi, Toshiba, Fujitsu, Canon, Casio, and others
Korea	Hyundai, Samsung, GoldStar
U.S.	SpectraVideo
Holland	Philips
Kuwait	Al Alamia Electronics
Brazil	Gradiente

In Japan,
the news that Matsushita and Sony would be pursuing a joint project(X) was extremely sensational.

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MSX Was Created as a Home Computer

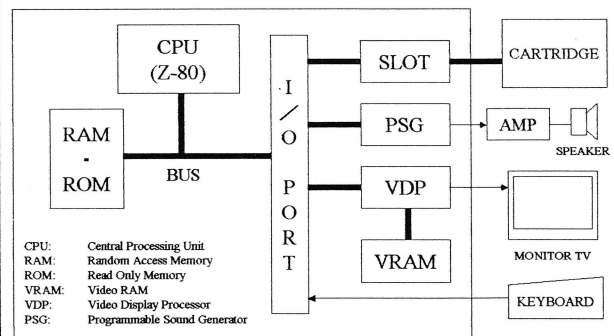A home computer can be defined as follows:

- Not an office computer
- Not a portable computer
- **The one computer in the home**

At the time, Microsoft used the slogan:

**Personal Computers
On Every Desktop
In Every Home**

1

MSX Block Diagram

CPU: Central Processing Unit
RAM: Random Access Memory
ROM: Read Only Memory
VRAM: Video RAM
VDP: Video Display Processor
PSG: Programmable Sound Generator

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My Early Thoughts on Getting a Computer into Every Home

- To further popularize computers, we needed **hardware that was compatible with software.**
  ↓
  * We designed the MSX personal computer, and then licensed production to hardware manufacturers and supported software development by software companies.
- To implement a rich audio-visual interface, we needed **enhanced graphic and audio functionality**.
  ↓
  * We developed an all-new special-purpose semiconductor.
- **We needed to reduce Computer prices.**
  ↓
  •This was impossible with the numbers of LSI in early MSX at the time, so we developed Very Large-Scale Integrated Semiconductor, MSX on a chip.

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Enhancement of Graphic and Audio Functionality

ASCII decided to develop customly designed semiconductors with Yamaha.

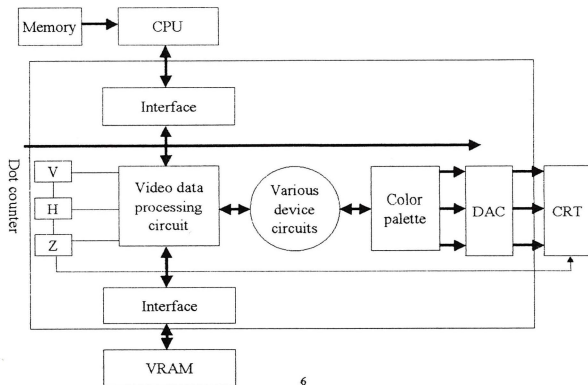**Need for highly-powered graphics on MSXs**
Graphic processor design
Study of graphic processor instruction set
Extension for CPU instruction set

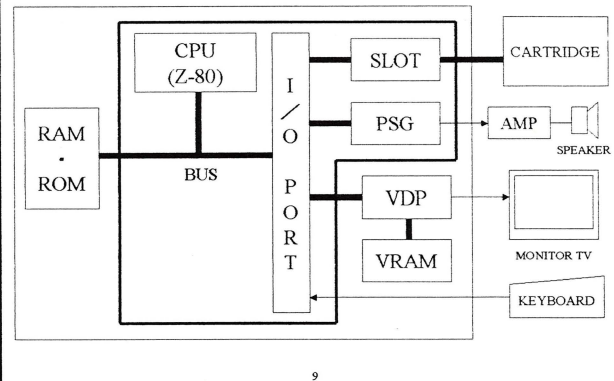**Need for advanced sound and music on MSXs**
Sound processor design
Study of sound processor instruction set
Built-into extended format for CPU instruction set

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Graphics LSI Chip (V9918, 9938, 9958 Series)

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Single-Chip MSX Block Diagram

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However, this sort of graphics and sound was inadequate.

↓

A PC needs true digital audio and digital video.

Need for digital audio I/O.
Development of digital audio compression technology.
Sound field expansion was a future issue.
Development digital video compression technology.
High-definition video compress was an issue.

ASCII's development with Matsushita, Sony, JVC, NTT commenced.

↓

This later developed into the ISO DAVA(Digital Audio Video Architecture) group.

↓

Development into MPEG1, MP3(MPEG Audio)

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However, no matter how far computer prices fell, they never penetrated into every home.

Something else besides a low price was required to popularize computers.

↓

I thought that a hint could be found in other things that have penetrated into every home.

Situation in Japan:
Population: 120 million/Households: 35 million
Items found in every home:

Telephones	55 million
TVs	65 million
Automobiles	60 million

I realized the common feature between them was all three had a network.

It was necessary to integrate into computers
the primary factors for TV and Telephone popularization.

The common link between telephones and TVs are:
They are both mediums.
They are both electronic mediums.
They are both online realtime mediums.

In short, I realized that the PC had to become a medium.

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Reducing PC Prices

To reduce PC prices, we partnered with Toshiba to begin development of a VLSI.

I thought PCs could penetrate every home if their price dropped.
20 million Nintendo Famicoms at 9,800 yen
3 million MSX computers at 39,800 yen

1.The chip was not that super integrated-no video. (tech and biz)
2.The price of Toshiba's single-chip model never came down.
ASCII was not that patient.
A.no hard negatiation, B.need for the second and third run.

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Integrating MSX with Communications Media

Trial manufacturing of a model that integrated videotex functionality into a PC.
• We recognized the need for content architecture to be symmetrical by both sending and receiving data.

Graphic and music content alone was not enough.
• We recognized the need for audio and video contents.

At Tsukuba Science Expo 85
• We were impressed by NTT's pictuerephone "Scope Phone"
(64 k ISDN Y interface) that NTT was exhibiting
• We started to pay the attention to the video phone development.

Launching of R&D for low-speed video compression.
• Vector Quantization only produced disappointing results.
• Through repeated trial and error using vector quantization, a certain level of results were obtained.

Noticing that many international standards were Discrete Cosine Transformation.
• We abandoned Vector Quantization.
• We further predicted that rate variability by Discrete Cosine Transformation would be the trend of the time.

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Integrating MSX with Broadcast Media

Trial manufacturing of a model that integrated teletext functionality into a PC.
- We realized that teletext broadcasts were ideal for program guides.

Development of a digital data broadcast system on cable TV.
Test at Suwa Lake City Cablevision
- A QPSK high-speed modem (6 Mbps) was developed for the test.
- We realized the need for a digital signal processor to overcome limits of analog technology.
- We realized the importance of digital video broadcasting over data broadcasting.

Development of digital TV broadcasting and satellite broadcasting using digital image compression.

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But wait a minute! Aren't today's PCs too complicated?

I don't think there are any computers out there that just anyone could easy to use.

Don't we need a computer that everyone can use?
Maybe we do still need MSX.

↓

Launch of the MSX Revival Project

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Integrating MSX with Packaged Media

CD audio is 74-minute sound media.

CD-ROM was devised to put voice, text, programs, and other data in addition to audio on CDs.

We wanted to put 74 minutes of video on a CD-ROM.
We were aiming to create new value by doing so.
- We focused on image compression technology and voice compression technology.

We placed the need for use even on communications and broadcast networks into the specifications from the beginning.

Based on the above-mentioned developments, the MPEG international standard was formed.
NTT and ASCII invited Sony, Matsushita, and Japan Victor to form the core group.
This core group proposed to ISO the specification that became the international standard.

Japan Victor Company developed the Video CD standard for use as Video CD Karaoke.
The companies like Sony and Philips followed this development by establishing the Video CD2 standard.

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Development of an Official Emulator

Once again designing and manufacturing a new MSX computer would be difficult.
It's almost impossible to obtain most of its original components.
↓
Revive MSX through software.

We are currently applying for the following name for the official MSX emulator:

MSX Player

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MSX was a home computer.
It had to be sold at a low price.
↓
Improving its basic performance was difficult no matter what was tried.
↓
Its basic performance was too low to introduce new technology.

However,
our involvement in MSX greatly contributed to
multimedia on today's PCs.

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MSX Player is multi multiplatforms.

Developed for Tao's (U.K.) intent OS
Currently supported platforms:
Windows, Windows CE, Linux, and others
* If intent for PS2 was developed, MSX PLAYER could run on that platform too.
CPUs on which intent currently runs:
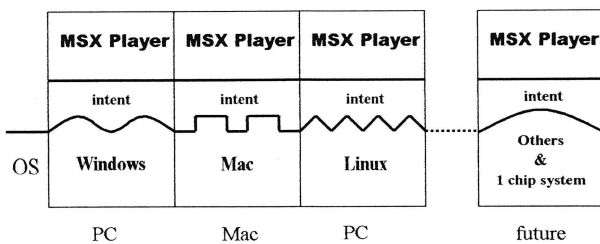Pentium, ARM/StrongARM, Hitachi SH, MIPS, and others
MSX Player can run on a large number of devices.
(PCs, pocket PCs, PDAs, game machines, and others)

Our goal is to have it run on mobile phones in the near future.
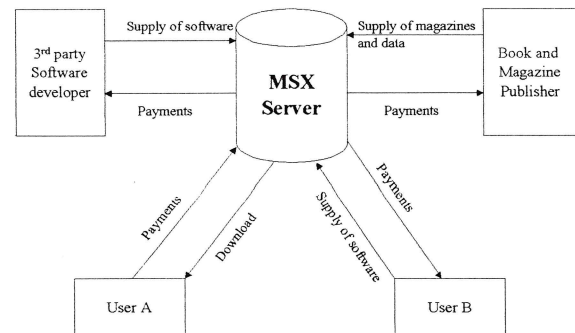
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MSX Player Diagram

MSX Player	MSX Player	MSX Player		MSX Player
intent	intent	intent		intent
Windows	Mac	Linux		Others & 1 chip system
PC	Mac	PC		future

OS

* It is also possible to use intent as a standalone OS.

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MSX Server Conceptual Diagram

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Significant of MSX Player Development

Ten years have passed since MSX vanished from the market.
  The whereabouts of the great content of the past is unknown.
  The great content of the past must be provided once more.
      ↓
No one buys a new computer to play old games.

Not only old content, but new content as well must be developed.
  A development environment must be provided once more.
  It should allow anyone to use BASIC or another language to create programs.
  Software companies should be encouraged to develop the software.
      ↓
No one buys a new computer to create content.

We will distribute MSX player to attract users.

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And then…

The development of
single-chip New MSX!

No name yet…

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MSX Server

Server for delivering all content for MSX
  • Enables the downloading of past software content at an
    extremely low price.
  • Delivers hardware data.
  • Delivers programming data.
  • Delivers magazines articles on MSX.
  • Enables the downloading of new content created by
    software developers.
  • Enables the uploading and public release of user-
    developed software.
  (A billing/electronic payment system will be introduced
      to enable many developers and individuals
      to see profits.)

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Basic Configuration of Single-Chip MSX

• Integrates ARM, Linux and Intent,
      and a high-performance new MSX onto a single chip,
      and runs all the previous versions of MSX software on an emulator
      operating on ARM.

• Perfects sound reproduction,
      which had been difficult through emulation alone,
      by including FM, PSG, and other sound sources on the MSX chip.

• The emulator running on ARM
      and high-performance new MSX can be switched by software.

• Supports wireless LAN and allows network use as a standard feature.

• Supports USB as a standard feature so that keyboards and pointing devices can be
   connected. (This will also enable support for MSX cartridge slots via serial IF.)

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Single-Chip MSX Design

- An ASIC solution and FPGA solution have been proposed for single-chip MSX.

- Both ASIC and FPGA have advantages and disadvantages. The more one of them can overcome its disadvantages, the more attractive it will be.

- The advantages of ASIC are low prices and mass production. The advantages of FPGA are its trainability and freedom.
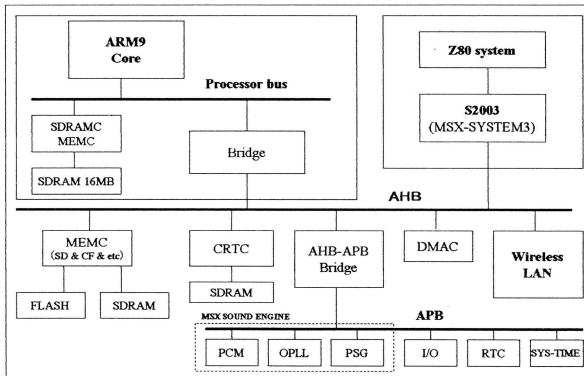
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New MSX Solution (under US$100 MSX)
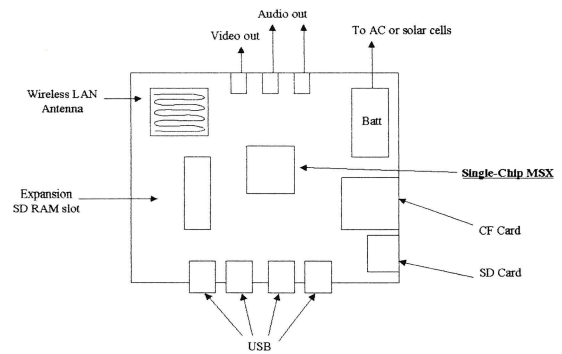
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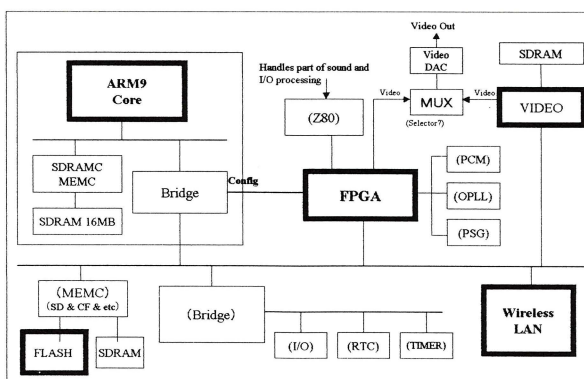## Single-Chip MSX Specification Design 1

(Equivalent to 120 MHz Z80 or 400 MHz ARM)

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Proposed Timetable

August 2001	Distribution of MSX Player for PC begins.
November 2001	MSX Server goes online.
4Q 2001	Distribution of MSX Player for various platforms.
1Q 2002	Single-chip MSX Tape out .
3Q 2002	Manufacturing of single-chip MSX begins.
1Q 2003	New MSX goes on sale.
2004	Single-chip MSX licenses open.

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Single-Chip MSX Specification Design 2

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